



NASA Technical Standards Program

NASA Technical Standards Program Overview

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Background and Context



NASA Technical Standards Program

- **Traditionally, NASA “standards” were built around specific programs (e.g. Shuttle, Space Station) and individual NASA Center practices**
- **Substantial use was made of MIL-Standards.**
- **NASA-wide technical standards were generally limited to specific areas:**
 - **Safety, Mission Assurance, electronics, data communications**
- **Technical standards were typically presumed “good forever” - until the next program changed them or specific problems were found**
- **NASA Technical Standards Program established in 1998**



Program Elements/Thrusts



NASA Technical Standards Program

- **Development of NASA Technical Standards**
- **Support and Adoption of Voluntary Consensus/ Non-Government Standards (PL100-113)**
- **Transition of Center Standards to NASA-wide Technical Standards**
- **Integrated Technical Standards System**
 - Agency-wide Full-text Technical Standards System
 - Standards Update Notification System (SUNS)
 - “Hot link” integration of Lessons Learned/Best Practices/Application Notes with NASA Technical Standards
- **Standards Awareness**



NASA Standards Taxonomy



NASA Technical Standards Program

Documentation and Configuration Management, Program Management

Configuration & Documentation Mgmt, Packaging, shipping & Handling, Reproduction & Document Archiving

Systems Engineering and Integration, Aerospace Environments, Celestial Mechanics

Orbital & Celestial mechanics, Aerospace Environments, System Engineering and Integration

Computer Systems, Software, Information Systems

Computer Design (Flight & Ground), Software Design (Flight & Ground), Computer & Software Security, Information Systems(ADP) & Network Communications Design

Human Factors and Health

Ergonomics, Health Science

Electrical Systems, Electronics, Avionics/Control systems, Optics

Electrical / Electronic Design including Printed Circuit Boards & Electrical Ground & Airborne Support Equipment
Electromagnetics and Electrical Discharge Control Guidance & Control, & Optics

Structures/Mechanical systems, Fluid, Thermal, Propulsion, Aerodynamics

Structural Design including Stress Corrosion control, Mechanical Design Including Mechanical & Propulsion Ground and Airborne Support Equipment, Propulsion Design, Thermal Design, Flight & Fluid Dynamics

Materials and Processes, Parts

Materials & Materials testing including Fluids & Propellants, Material Processes, manufacturing, Parts (Mechanical, Electrical, Optical)

System Test, Analysis, Modeling, Evaluation

System and Subsystem testing including Environmental testing, Test Evaluation, Analysis and Modeling

Safety, Quality, Reliability, Maintainability

Safety (Flight, ground, Personnel and Equipment), Quality (Hardware and Software), Reliability (Hardware and Software)
Maintainability (Hardware and Software)

Operations, Command, Control, Telemetry/Data Systems, Communications

Flight and Ground Operations, Mission Command & Control, Telemetry and Data Systems Design, RF Communications Design

Specifications and Standards for use on Construction Projects (SPECSTACT)

Facilities Design, Roads and Grounds Support (Local transportation, fire control, Telephones, Health Care, Etc.)



NASA Technical Standards



NASA Technical Standards Program

- **59 NASA-Developed Technical Standards**
 - 21 Engineering Standards
 - 20 Information Technology Standards
 - 18 Safety and Mission Assurance Standards
- **2247 Adopted Standards**
 - 1547 Non-Government Voluntary Consensus Standards
 - 543 DOD/MIL-STD's; 21 other Federal documents
- **In Development or Pending Adoption**
 - 20 NASA Technical Standards in Development
 - 22 Supporting development for Non-NASA Standards
 - 980 Additional Standards Identified for Potential Adoption



FY2003 OMB Circular A-119

NASA Annual Report



NASA Technical Standards Program

For FY2003, NASA reported 144 employees participating in 33 Voluntary Consensus Standards (VCS) bodies

- 10% Increase in number of participants**
- 266 new VCSs Adopted for use in FY 2003**
- NASA Substituted 1 Voluntary Consensus Standard for a Government Unique Standard**

Participation Breakdown by Centers

ARC - 4	HQ - 8	LaRC - 12
DFRC - 1	JPL - 36	MSFC - 18
GRC - 11	JSC - 12	SSC - 2
GSFC - 23	KSC - 12	WSTF - 5



NASA Technical Standards System



NASA Technical Standards Program

- **Initiated in FY2000: 5 year, fixed price contract**
- **Listings available to public; full text to nasa.gov only**
- **Provides “one stop”, transparent access to standards from more than 108 standards developing organizations**
 - **NASA “preferred” technical standards:**
 - ***Standards developed by NASA Centers and Programs***
 - ***Other government standards (FAA, Navy, DoD, DoE, etc)***
- **Links to related technical information, e.g.**

Document Summary Page

MIL-STD-1686	Revision: C	Status: Active	NASA Status: Preferred
DoDISS info	No. of NASA Accesses since 06/2001: 118	SDO: MIL	Year Reaffirmed:
TITLE: ELECTROSTATIC DISCHARGE CONTROL PROGRAM FOR PROTECTION OF ELECTRICAL AND ELECTRONIC PARTS, ASSEMBLIES AND EQUIPMENT (EXCLUDING ELECTRICALLY INITIATED EXPLOSIVE DEVICES) (SUPERSEDING MIL-STD-1686B)			Request Standard Update Notification
Base	Date: 10/25/1995	19 pages	View Doc View TOC

Document Scope

[Base - 10/25/1995]

The purpose of this standard is to establish comprehensive requirements for an ESD control program to minimize the effects of ESD on parts, assemblies, and equipment. An effective ESD control program will increase reliability and decrease both maintenance actions and lifetime costs. This standard shall be tailored for various types of acquisitions.

Application Notes

[Submit Application Note](#)

Applicable Revision	Project ID	NASA Center	Creation Date	Note
All	-	JPL	4/26/2001	Requires that each facility have a document that describes how they implement ESD controls (for example, see MSFC-RQMT-2918).

Lessons-Learned and Best-Practices

LL/BP No.	Title	Date	Relevance to the Standard
GSFC-0032	Assessment and Control of Electrical Charges		This practice references the use of MIL-STD-1686 to establish comprehensive requirements for an ESD control program to minimize the effects of ESD on parts, assemblies, and equipment.
LLIS-0151	Throat Plug and Purge Adapter Assembly Grounding	10/8/1992	This lesson addresses a scenario where improperly grounding the throat plug and adapter assembly or a lack of grounding may cause static electricity build-up and electrical sparks which could act as an ignition source for any flammable vapors present.
LLIS-0301	Electrostatic Discharge (ESD) Wrist Strap Contamination of Magellan Flight Hardware	9/15/1993	Electrostatic Discharge (ESD) wrist straps can shed conductive METALLIC fibers into electronic hardware.
LLIS-0685	Electrostatic Discharge (ESD) Control in GSE	2/1/1999	The Lesson provides technical recommendations for the control of ESD in aerospace equipment.
LLIS-0732	Electrostatic Discharge (ESD) Control in Flight Hardware	2/1/1999	The Lesson addresses the generation of triboelectric and electrostatic charges as a common cause of damage and/or degradation to unprotected Electrostatic Discharge Sensitive



Use of NASA Full-Text Technical Standards System

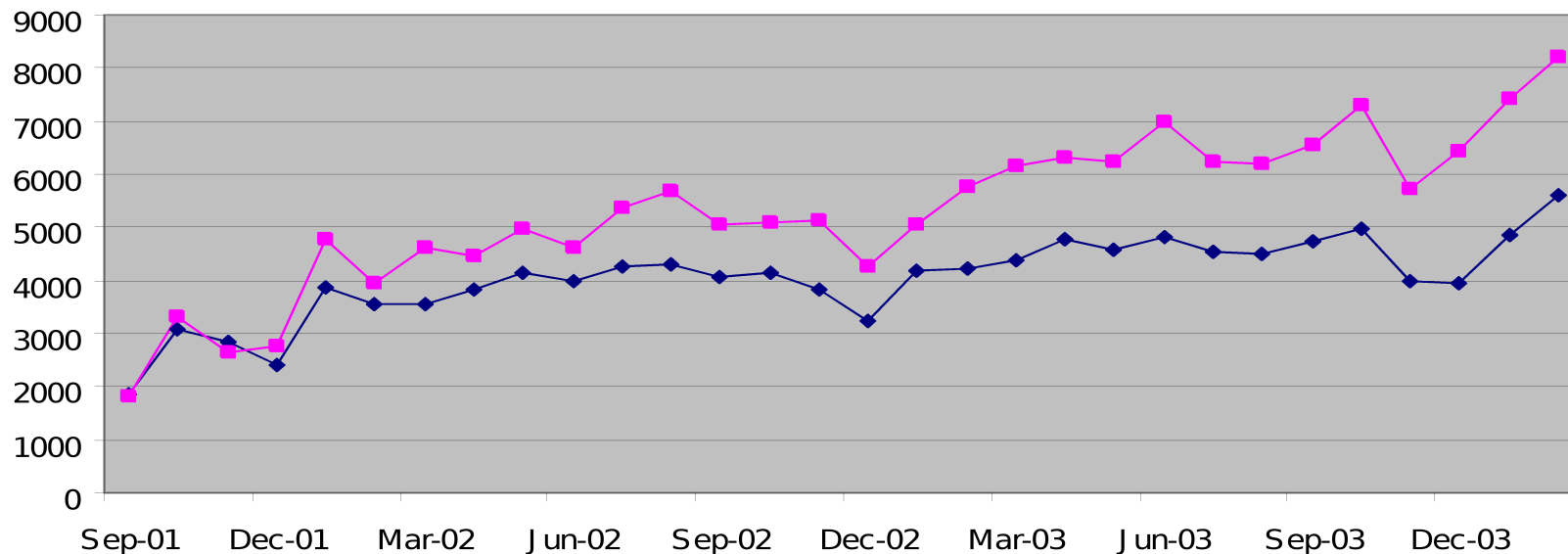


NASA Technical Standards Program

Total Accesses:	127528
Total Downloads:	165139

Accesses and Downloads
to Full-Text Technical Standards
by NASA.gov Domain
Period: Jul 2001 - Feb 2004

◆ Accesses
■ Documents Downloaded





On-Going Survey Use of Technical Standards



NASA Technical Standards Program

- **New users queried on first download from the system**
- **Approximately 3800 user responses: July, 2003 to February, 2004.**

Date of Data	Development of Program Requirements	In-House R&D Activities	Verification of Contractor Products	Acquisition of Parts or Materials	Evaluation of Proposals	Education and Training	Other Uses
Results Oct. 2003	813 (23.1%)	1017 (28.9%)	652 (18.5%)	374 (10.6%)	127 (3.6%)	334 (9.5%)	194 (5.5%)
Results Feb 2004	1331 (23.4%)	1685 (29.6%)	1033 (18.1%)	537 (9.4%)	199 (3.5%)	588 (10.3%)	308 (5.4%)



Standards Update Notification System (SUNS)



NASA Technical Standards Program

- **SUNS allows users to register standards used and receive notification when standards are revised**
- **Using out-of-date standards misses the benefits of experience, risks repeating failures**
- **Pilot test on Space Shuttle Solid Rocket subsystem**
 - **552 standards cited; all but 124 cancelled, replaced**
 - **Program assessing impact of revised standards**
- **Similar results with Shuttle Program level**



Integrating Lessons Learned



NASA Technical Standards Program

- **NASA Lessons Learned System documents problems and guidance from program and project experience**
- **Linking Lessons Learned with standards provides basis for interpretation/use and update of standards**
- **Users alerted to Lessons Learned at the time they come looking for the standards**
- **Current status**
 - **543 out of 1700 Lessons Learned hot-linked to 354 standards**
 - **“Reverse” search capability permits users to view standards relevant to specific lessons**
 - **Now adding “Application Notes” to share**



Issues and Current Directions



NASA Technical Standards Program

- **Easy access to an integrated system has significantly improved attention to/use of standards in NASA**
 - **Market issues could threaten access to integrated solutions**
- **Recommendations from the Space Shuttle Columbia Accident leading to mandatory standards for NASA and independent technical approval of application**
 - **AF/SMC approach appears to be a good model**
- **The standards community can contribute significantly to expanded uses of expertise enabled by information technology and knowledge management**